

097203-020304

Mode	Data rate (Mbps)	Target application	Receiver sensitivity	Power consumption ('2001)	
				Rx. average	Tx. average
Mode 1.0 (Bluetooth)	1 Mbps		-84 dBm	25 <i>mW</i>	15 <i>mW</i>
Mode 2.0	2.6-3.9 Mbps	Audio	-78 dBm	30 <i>mW</i>	20 <i>mW</i>
Mode 3.0	22-44 Mbps	Video, computer graphics	-69 dBm	95 <i>mW</i>	60 <i>mW</i>

Figure 1

FOUO 2010-03-24

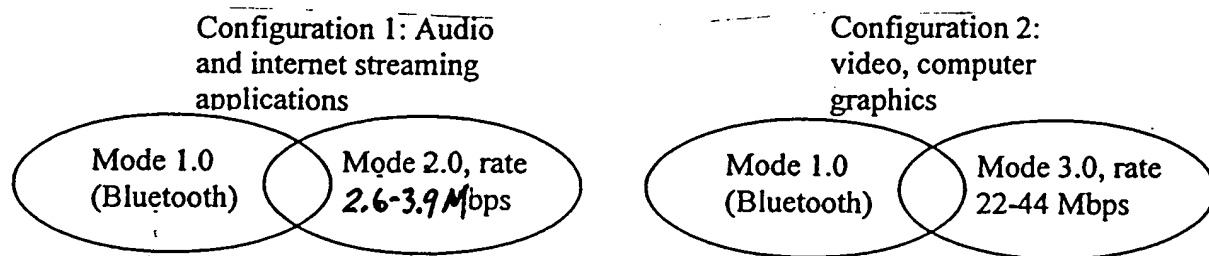


Figure 2

Parameters	Mode 1 (Bluetooth)	Mode 2
Frequency hopping	1600 Hz	Same as Bluetooth
Filter spectrum		Same as Bluetooth 1600 Hz
Modulation	GFSK	16, 64 QAM
Maximum data rate	1 Mbps	2.6, 3.9 Mbps
Acquisition		Using mode 1 then switch to mode 2
Transmit power	0 dBm	0 dBm, 6 dBm
Distance	10 m.	10 m.
Nominal packet error rate	10 %	10 %
Margin + Noise figure	37 dB	37 dB
Receiver sensitivity	-84 dBm	-84, -78 dBm
Coding	ARQ	ARQ + convolutional code across packets

Figure 3

105020" E024460

Frequency offset	Transmit power
+/- 550 kHz	-20 dBc
$ M-N = 2$	-20 dBm
$ M-N \geq 3$	-40 dBm

Figure 4

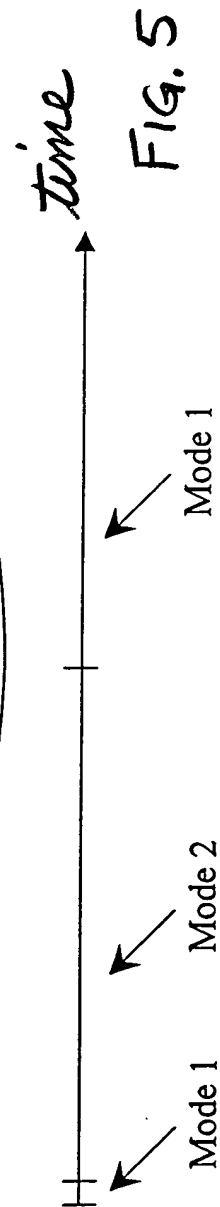
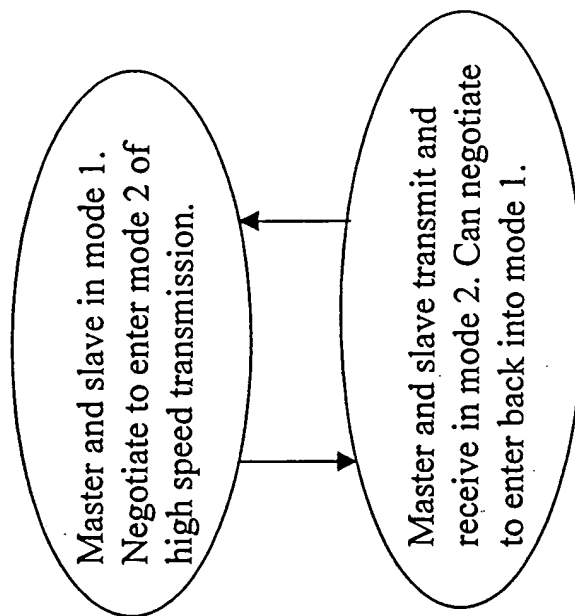


FIG. 5

097203-020501
T05020-E022260

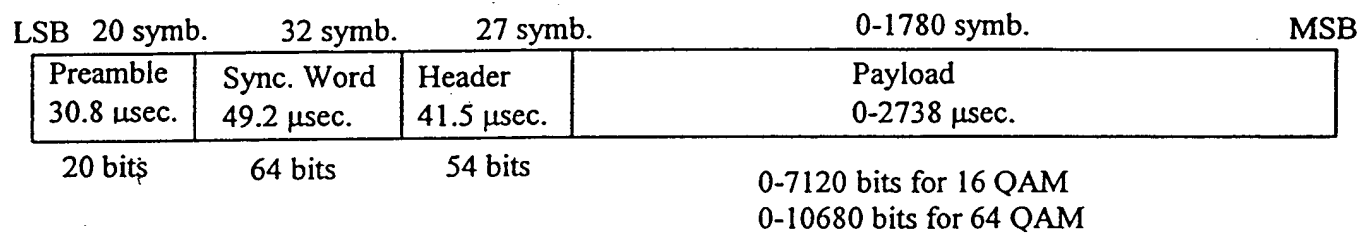


Figure 6

0977203-020504

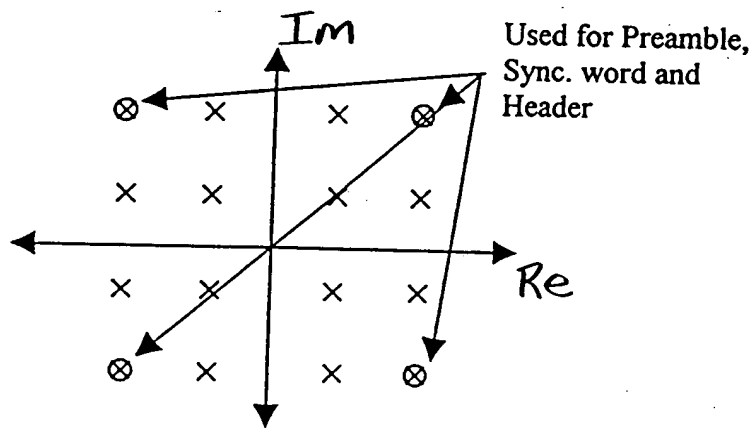


Figure 6A

0977203-020501
T05020-E022260

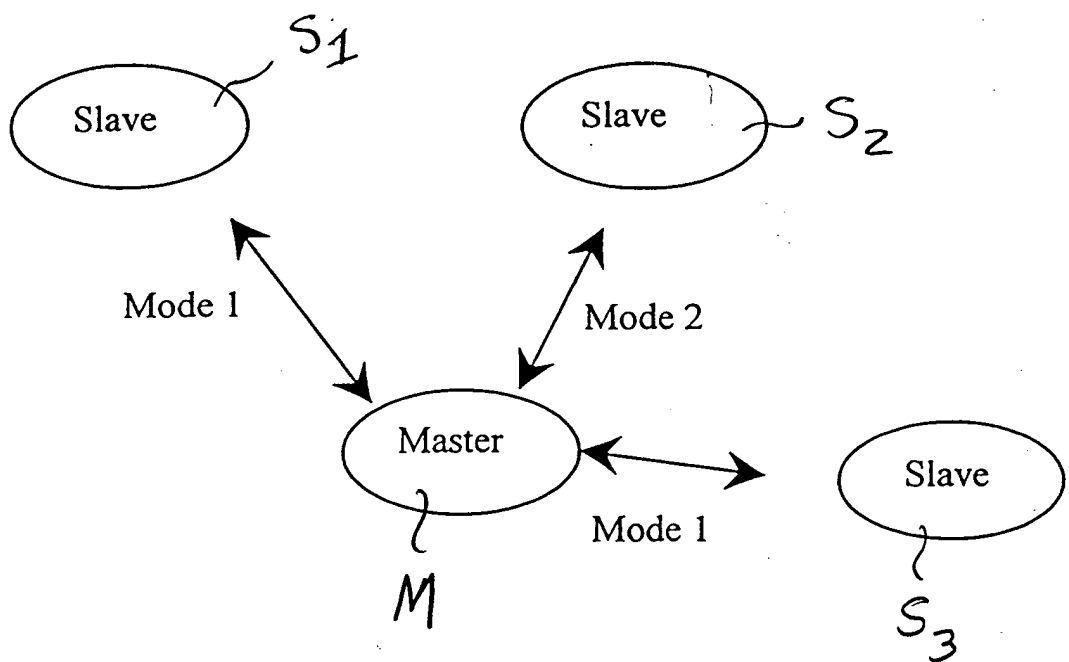


Figure 7

0977203-020504

M	S ₁	M	S ₂	M	S ₃	M	S ₁	M	S ₂	M	S ₃
Mode 1	Mode 1	Mode 2	Mode 2	Mode 1	Mode 1	Mode 1	Mode 1	Mode 2	Mode 2	Mode 1	Mode 1


time

Figure 8

0977203-020501

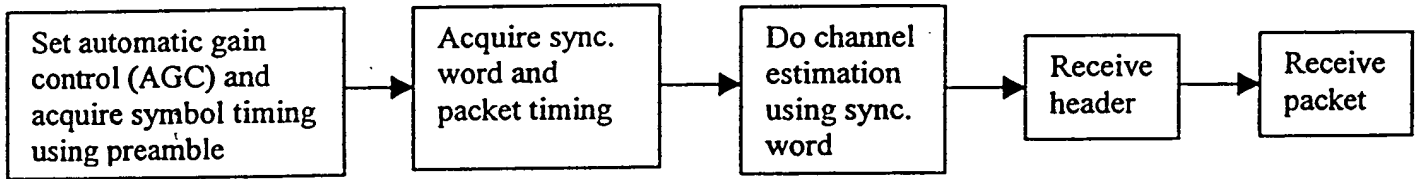


Figure 9

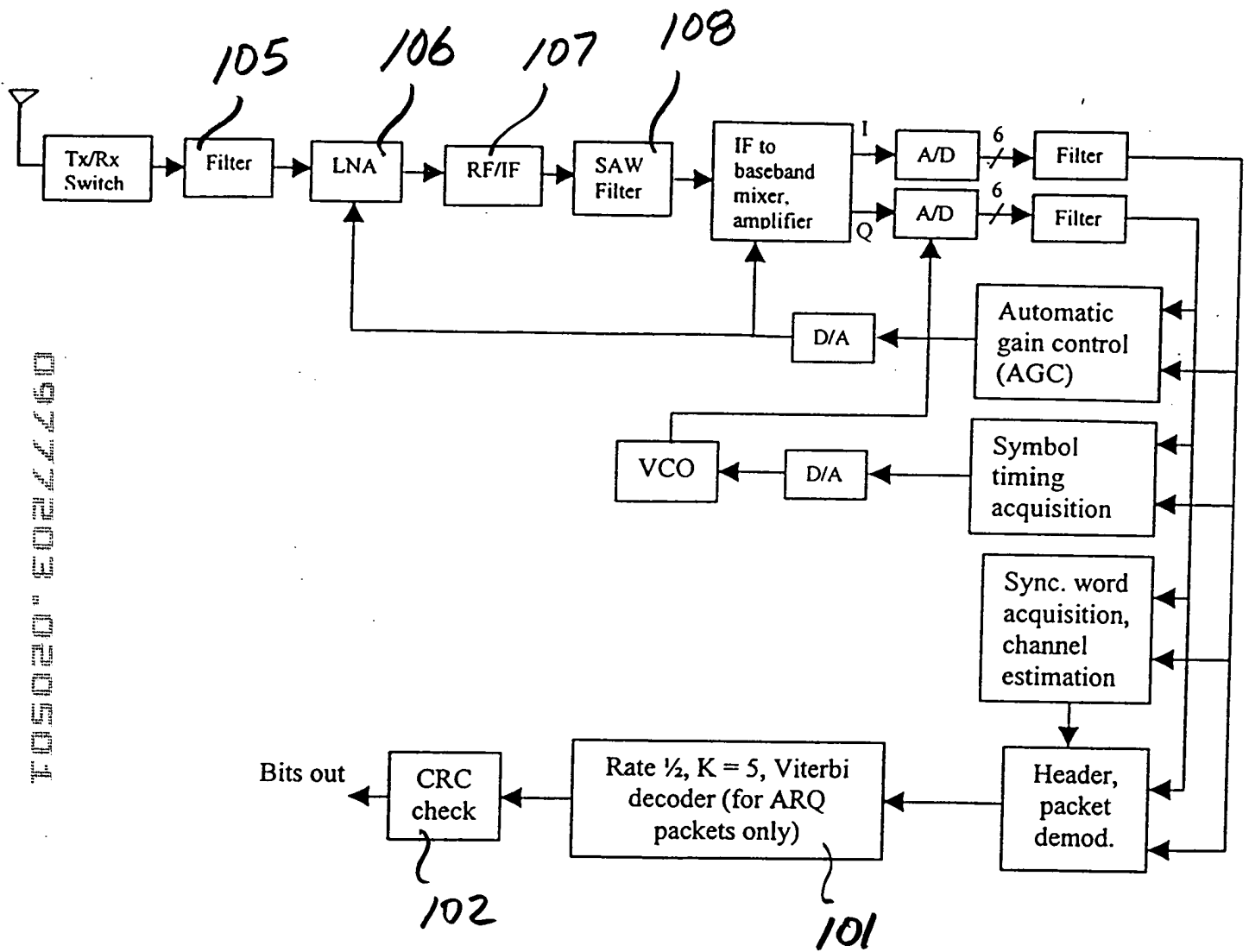


Figure 10

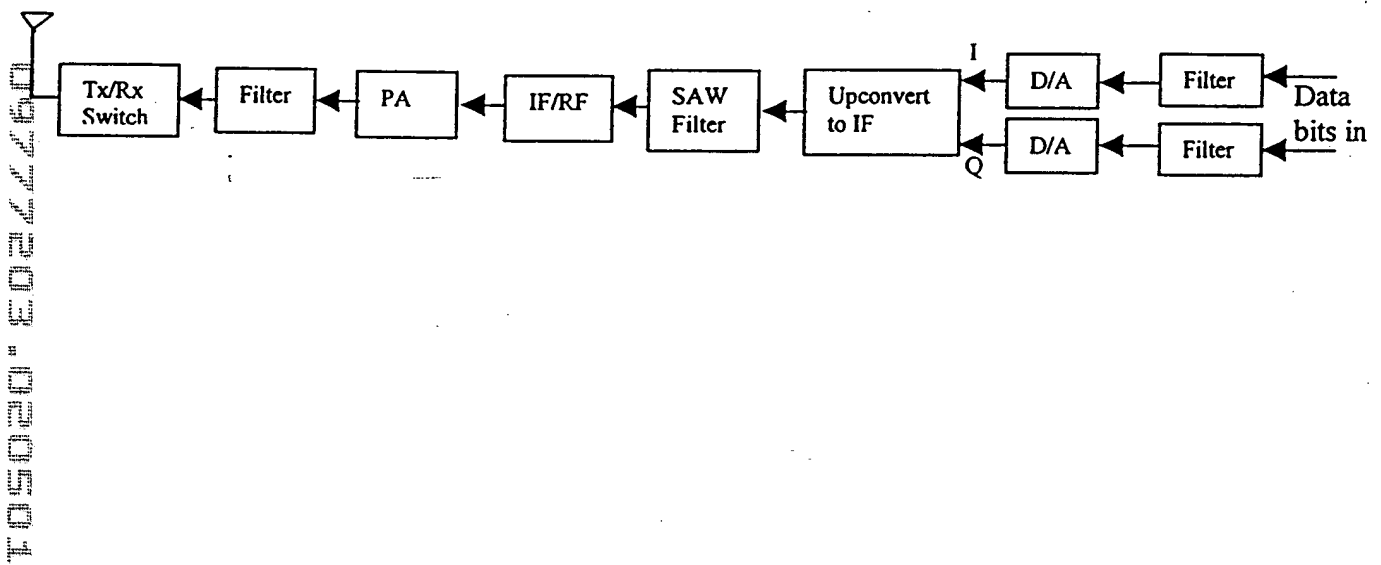


Figure 11

09777203-020501

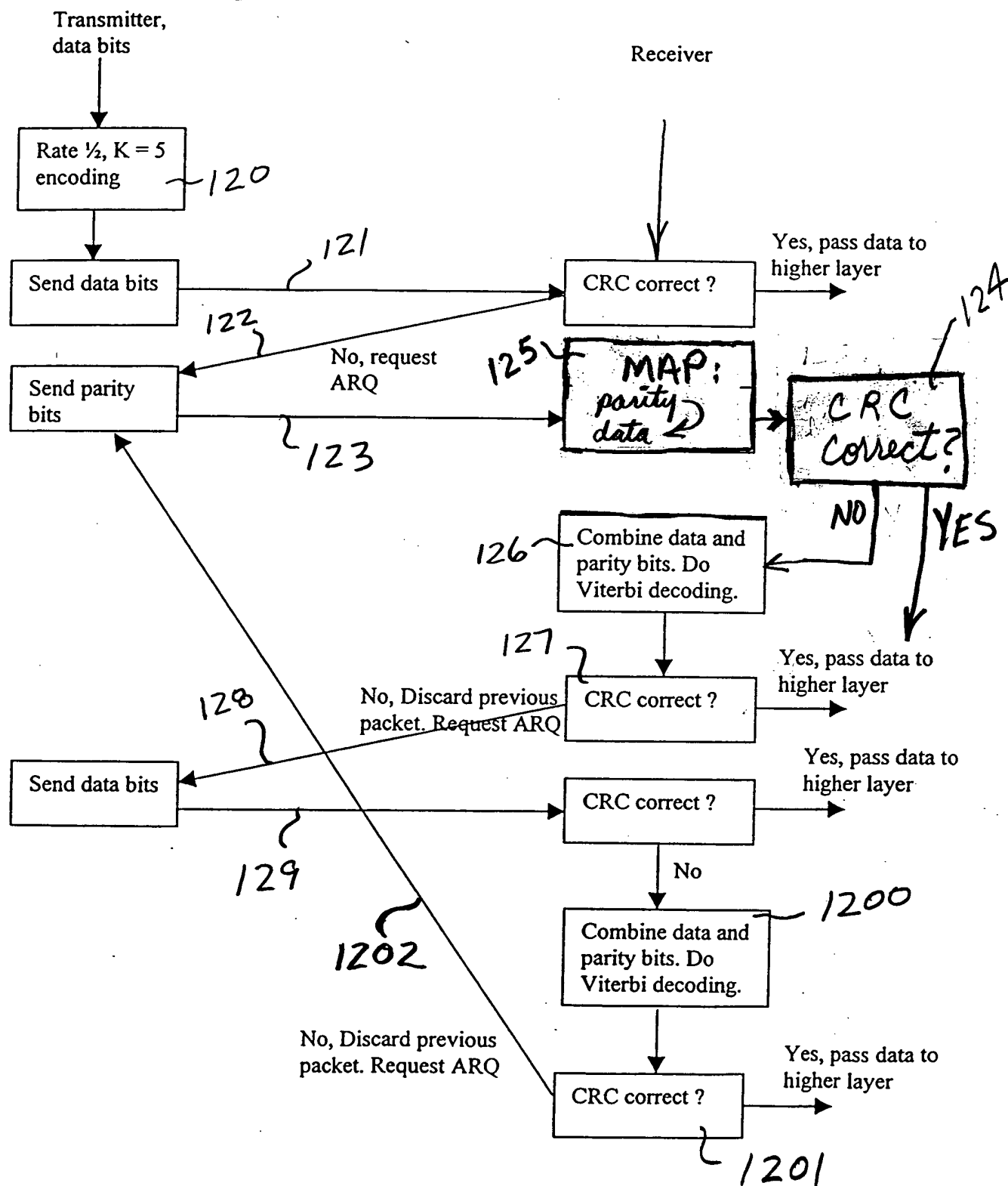


Figure 12

0977203-020501
T05020-0027460

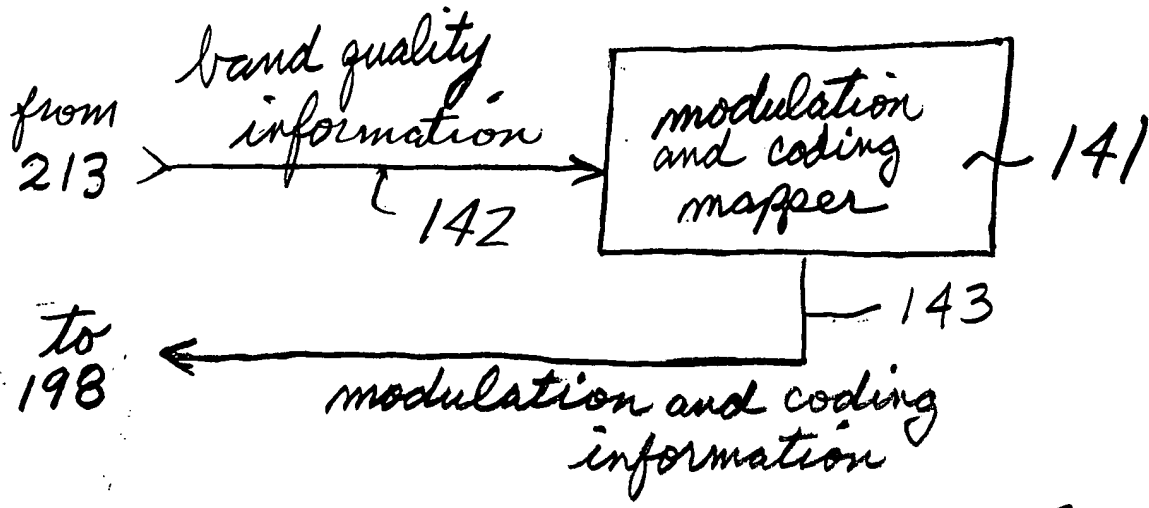


FIG. 14B

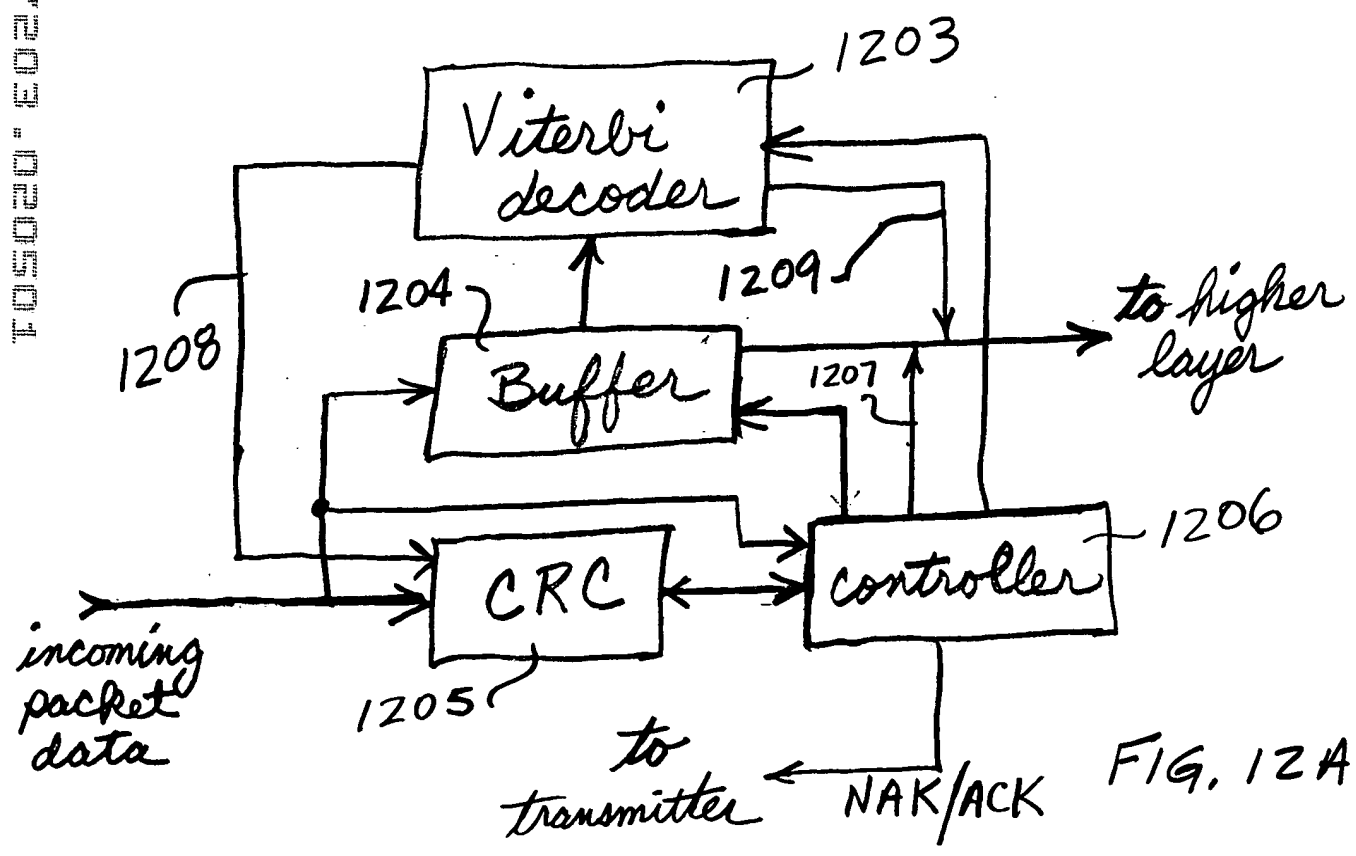


FIG. 12A

0977203-020501

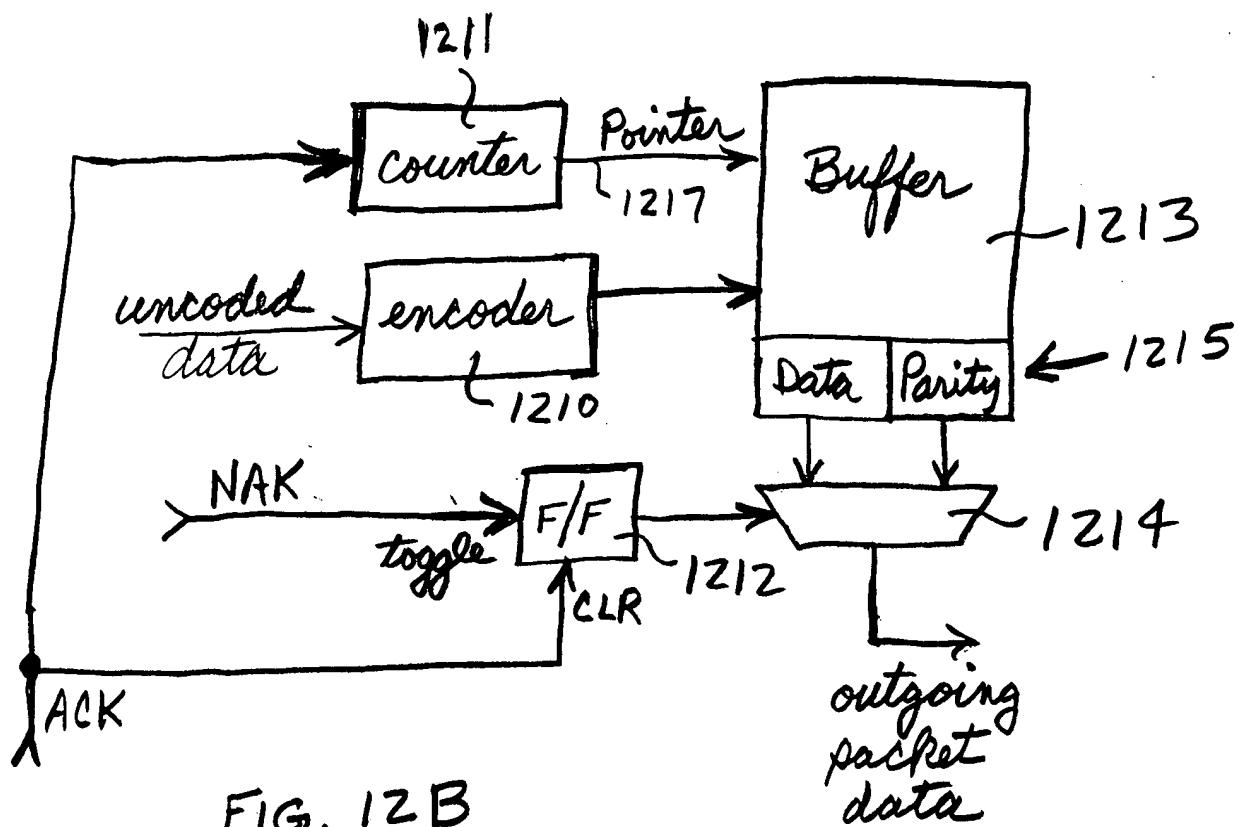


FIG. 12B

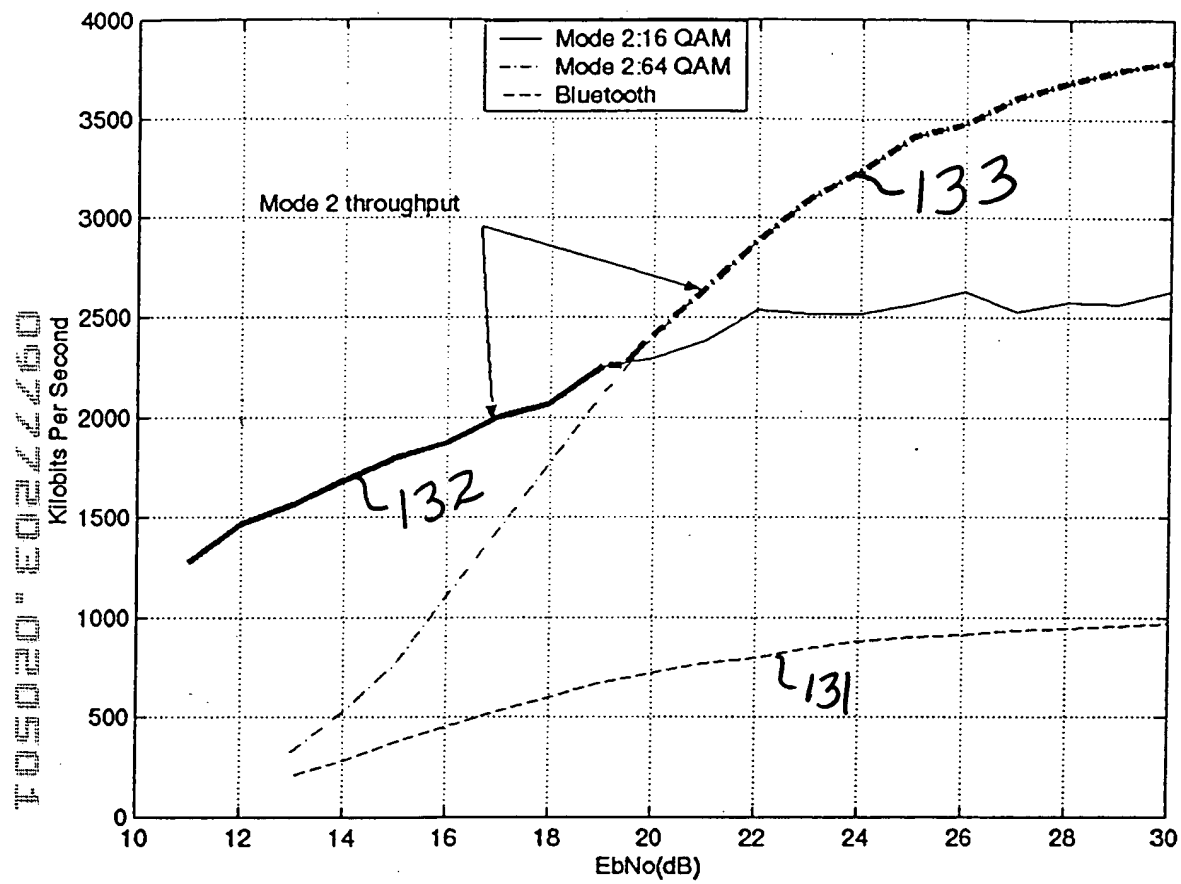


Figure 13

Parameters	1	2	3	4	5
Filter spectrum	802.11b	802.11b	802.11b	802.11b	802.11b
Modulation	QPSK	QPSK	16 QAM	16 QAM	16 QAM
Scrambling code length	256	256	256	256	256
Physical data rate	22 Mbps	22 Mbps	44 Mbps	44 Mbps	44 Mbps
Coding	Rate 1/2, Turbo (SCCC)	None	Rate 1/2, Turbo (SCCC)	Rate 3/4, Turbo (SCCC)	None
ARQ	Optional	Optional	Optional	Optional	Optional
Maximum data rate	11 Mbps	22 Mbps	22 Mbps	33 Mbps	44 Mbps
Transmit power	-1 dBm	8 dBm	4 dBm	8 dBm	15 dBm
Distance	10 m.	10 m.	10 m.	10 m.	10 m.
Bit error rate	1e-8	1e-8	1e-8	1e-8	1e-8
Packet error rate	1e-4	1e-4	1e-4	1e-4	1e-4
Margin+Noise figure	37 dB	37 dB	37 dB	37 dB	37 dB
Receiver sensitivity	-85 dBm	-76 dBm	-80 dBm	-76 dBm	-69 dBm
Frequency diversity	Band selection	Band selection	Band selection	Band selection	Band selection
SYMBOL RATE	11 Msps	11 Msps	11 Msps	11 Msps	11 Msps
SPREADING	11 Mcps	11 Mcps	11 Mcps	11 Mcps	11 Mcps

Figure 14

	Max. data rate	Modulation	Symbol rate	Coding	Spreading
18	18 Mbps	QPSK	18 Msps	rate 1/2	18 Mchips/sec
19	36 Mbps	QPSK	18 Msps	rate 1	18 Mchips/sec
20	36 Mbps	16 QAM	18 Msps	rate 1/2	18 Mchips/sec
21	54 Mbps	16 QAM	18 Msps	rate 3/4	18 Mchips/sec
22	72 Mbps	16 QAM	18Msps	rate 1	18 Mchips/sec

FIG. 14A

105020-0024460

Parameters	6	7	8	9	10
Filter spectrum	802.11b	802.11b	802.11b	802.11b	802.11b
Modulation	QPSK	QPSK	QPSK	QPSK	QPSK
Scrambling code length	256	256	256	256	256
Physical data rate	22 Mbps	22 Mbps	22 Mbps	22 Mbps	22 Mbps
Coding	Rate 1/2, Turbo	Rate 2/3, Turbo	Rate 3/4, Turbo	Rate 4/5, Turbo	Rate 5/6, Turbo
ARQ	Optional	Optional	Optional	Optional	Optional
Maximum data rate	11 Mbps	14.67 Mbps	16.5 Mbps	17.6 Mbps	18.33 Mbps

FIG. 14C

0977203-020501

Parameters	11	12	13	14	15	16	17
Filter spectrum	802.11b	802.11b	802.11b	802.11b	802.11b	802.11b	802.11b
Modulation	8-PSK	8-PSK	8-PSK	8-PSK	8-PSK	8-PSK	8-PSK
Scrambling code length	256	256	256	256	256	256	256
Physical data rate	33 Mbps	33 Mbps	33 Mbps	33 Mbps	33 Mbps	33 Mbps	33 Mbps
Coding	None	Rate 1/3, Turbo	Rate 1/2, Turbo	Rate 2/3, Turbo	Rate 3/4, Turbo	Rate 4/5, Turbo	Rate 5/6, Turbo
ARQ	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Maximum data rate	33 Mbps	11 Mbps	16.5 Mbps	22 Mbps	24.75 Mbps	26.4 Mbps	27.5 Mbps

FIG. 14D

105020-EO22260

105020" 022460

Frequency offset	Transmit power
f_c	0 dBc
+/- 11MHz	-30 dBc
+/- 22 MHz	-50 dBm

Figure 15

105020" E024460

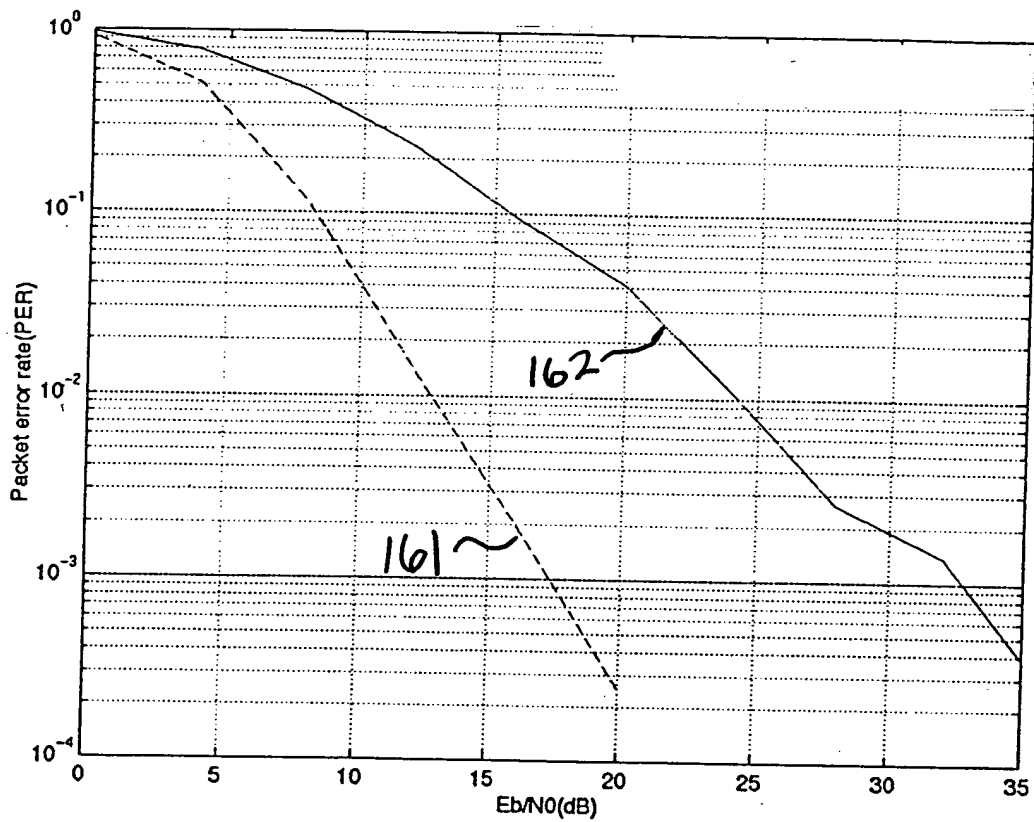


Figure 16

System in mode 1 (Bluetooth 1.0) for 25 ms.
Searches for good frequencies for 7.5 msec.
Communication with other Bluetooth devices,
17.5 msec.

System in mode 3 achieves high data transmission on one of the good 22 MHz bands selected in mode 1. Revert to mode 1 after 225 ms to find a new good frequency and communicate with other Bluetooth devices.

Figure 17

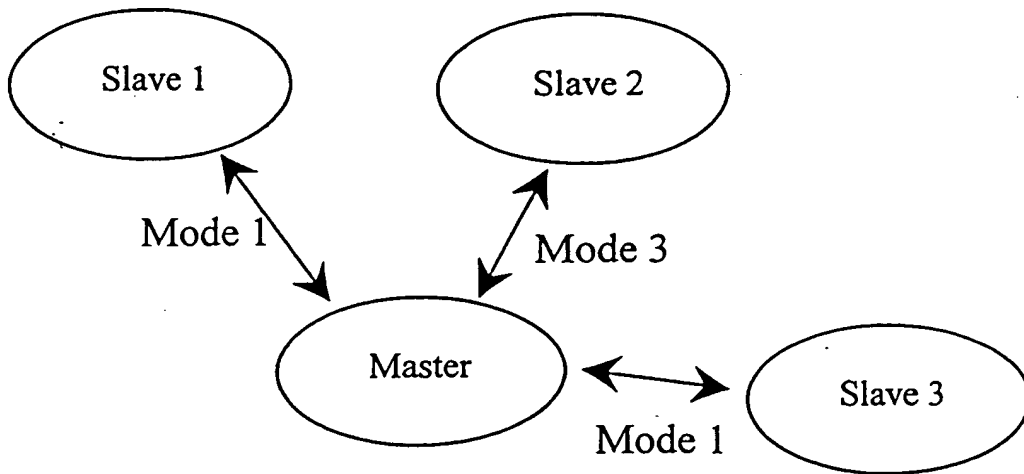


Figure 18

0077203-020501
105020-0022260

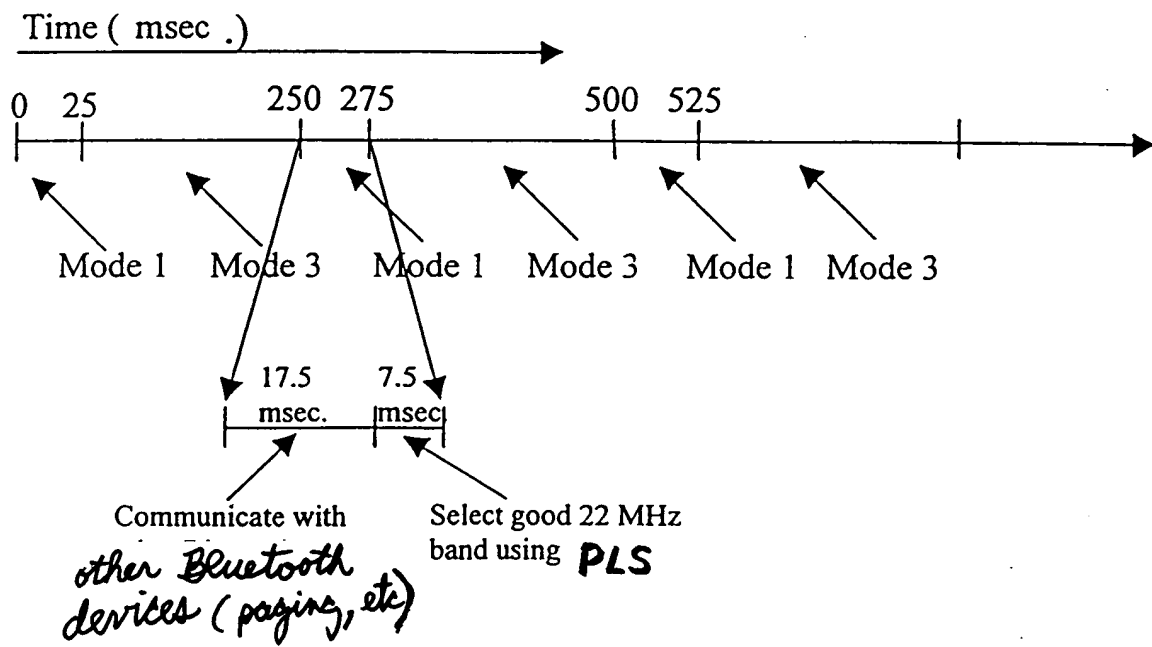
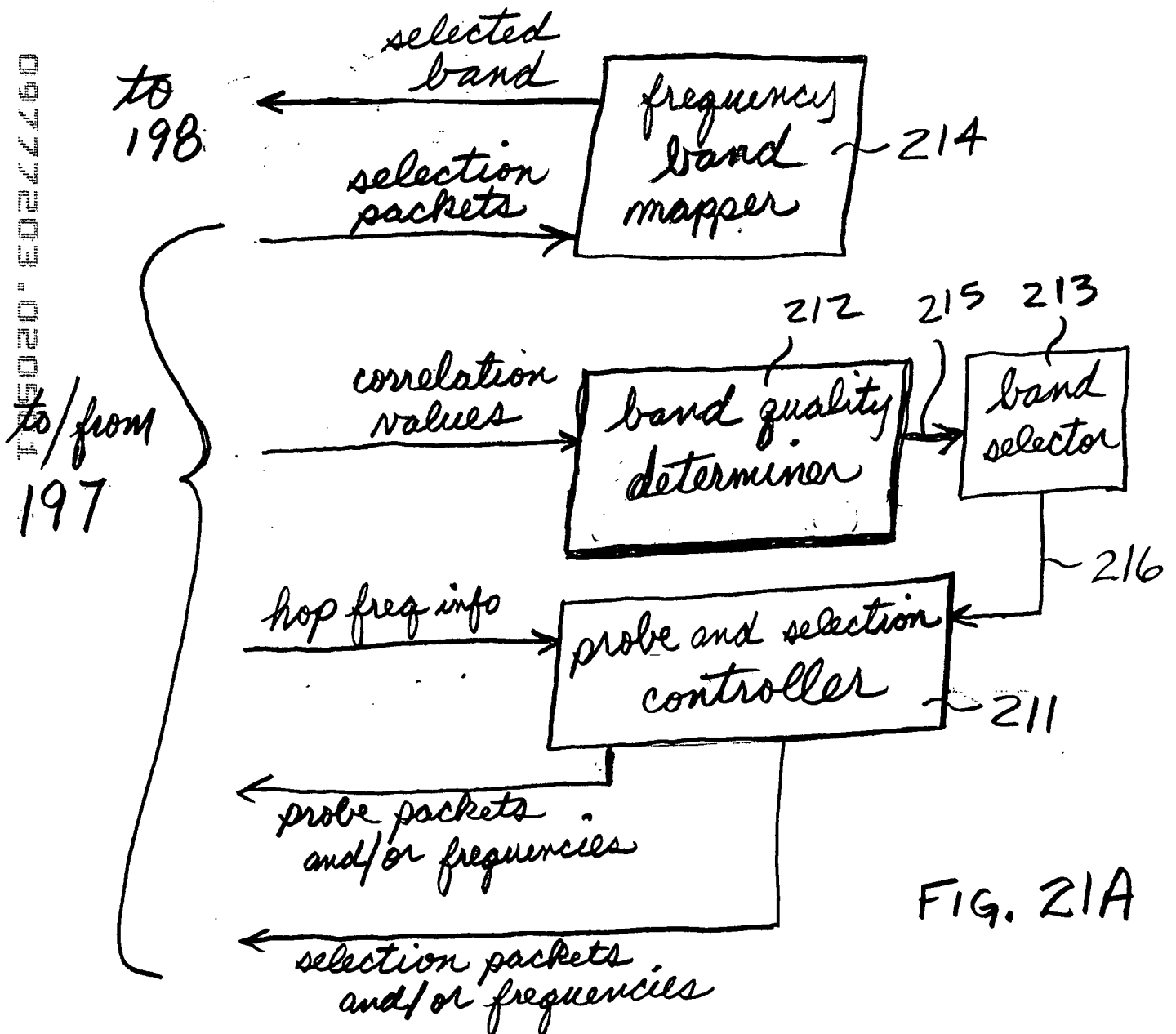
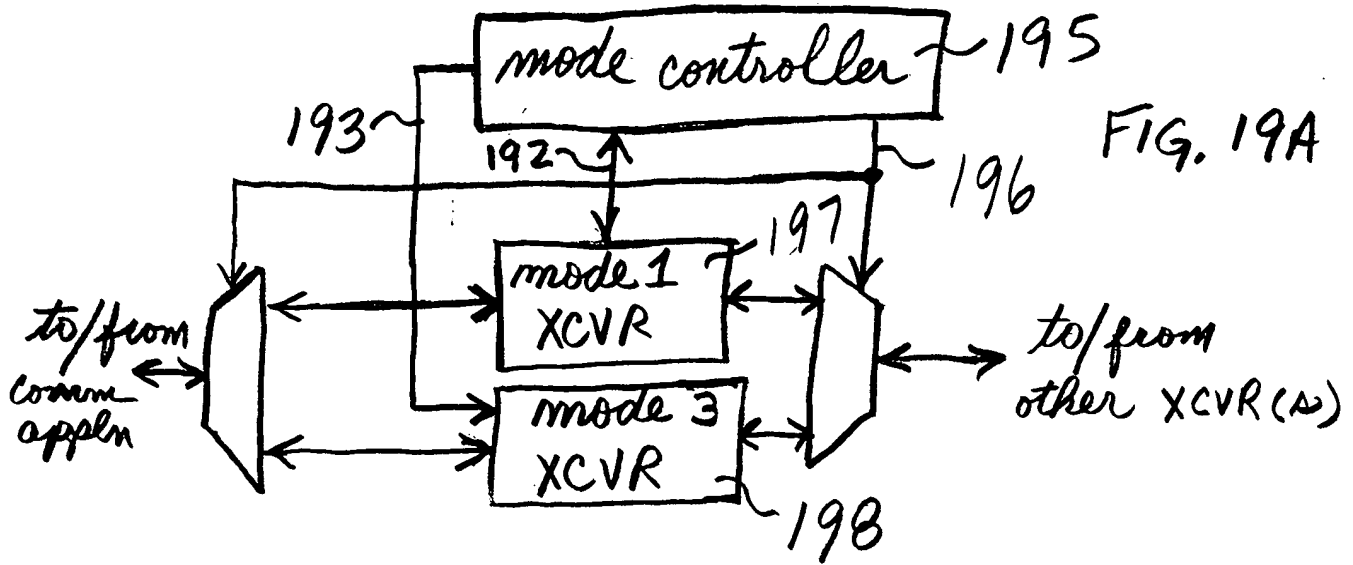


Figure 19

0977203.020541



0977203-020501
F05020-F027760

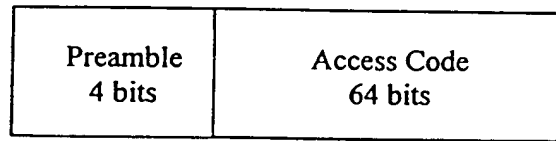


Figure 20

097720-020501
T05020-603460

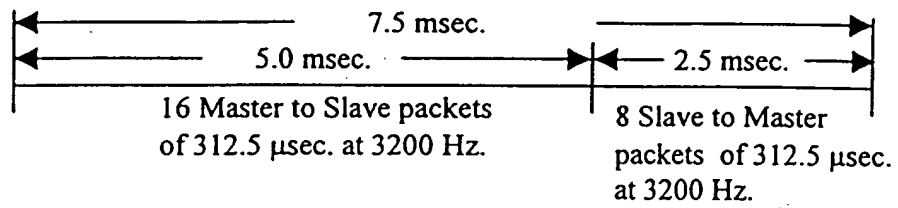


Figure 21

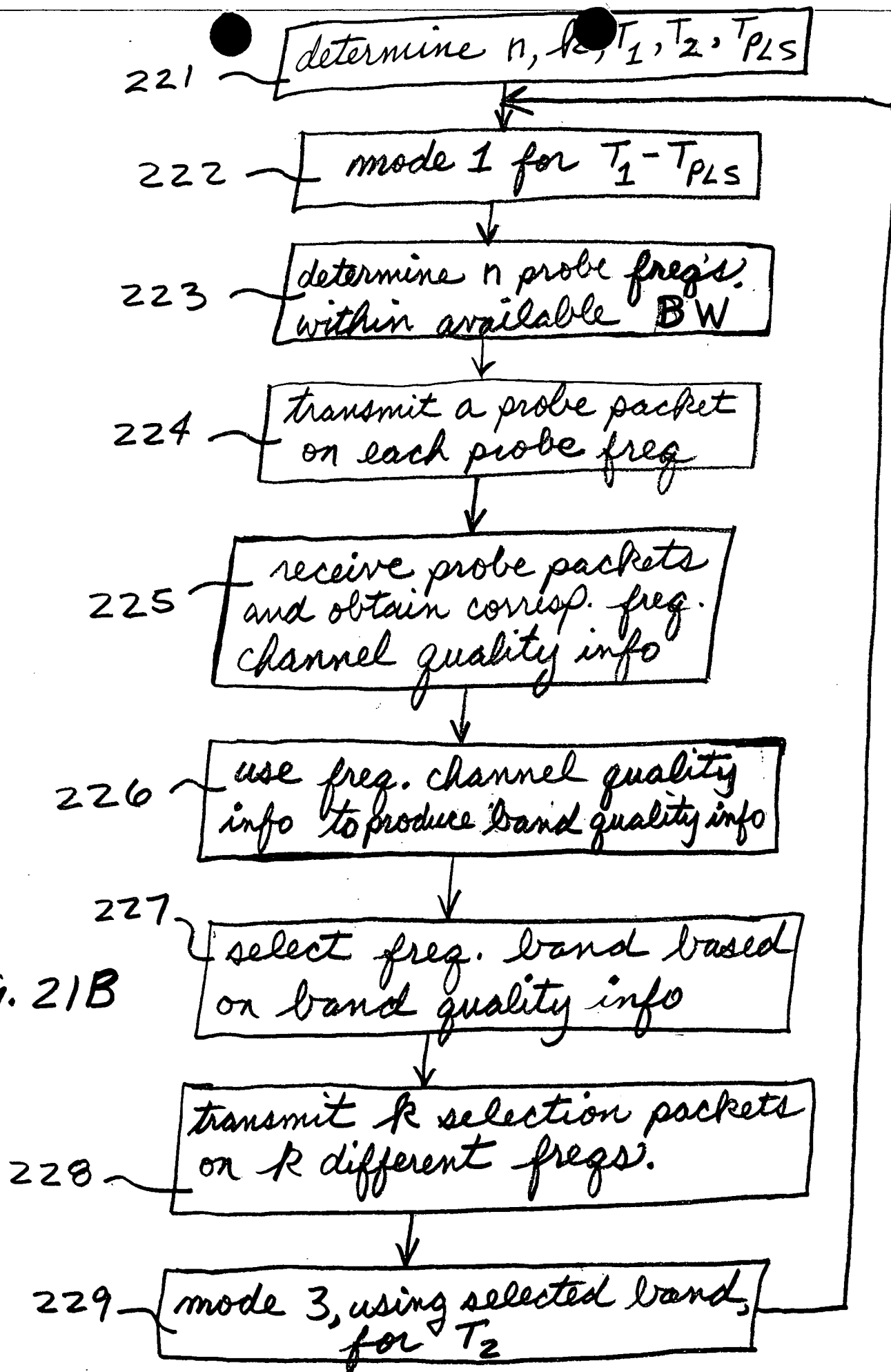


FIG. 21B

0977203-020501
T05020-EO2760

Preamble 4 bits	Access Code 64 bits	Channel Edge Frequency Index $6 \times 3 = 18$ bits
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Figure 22

105020" E02460

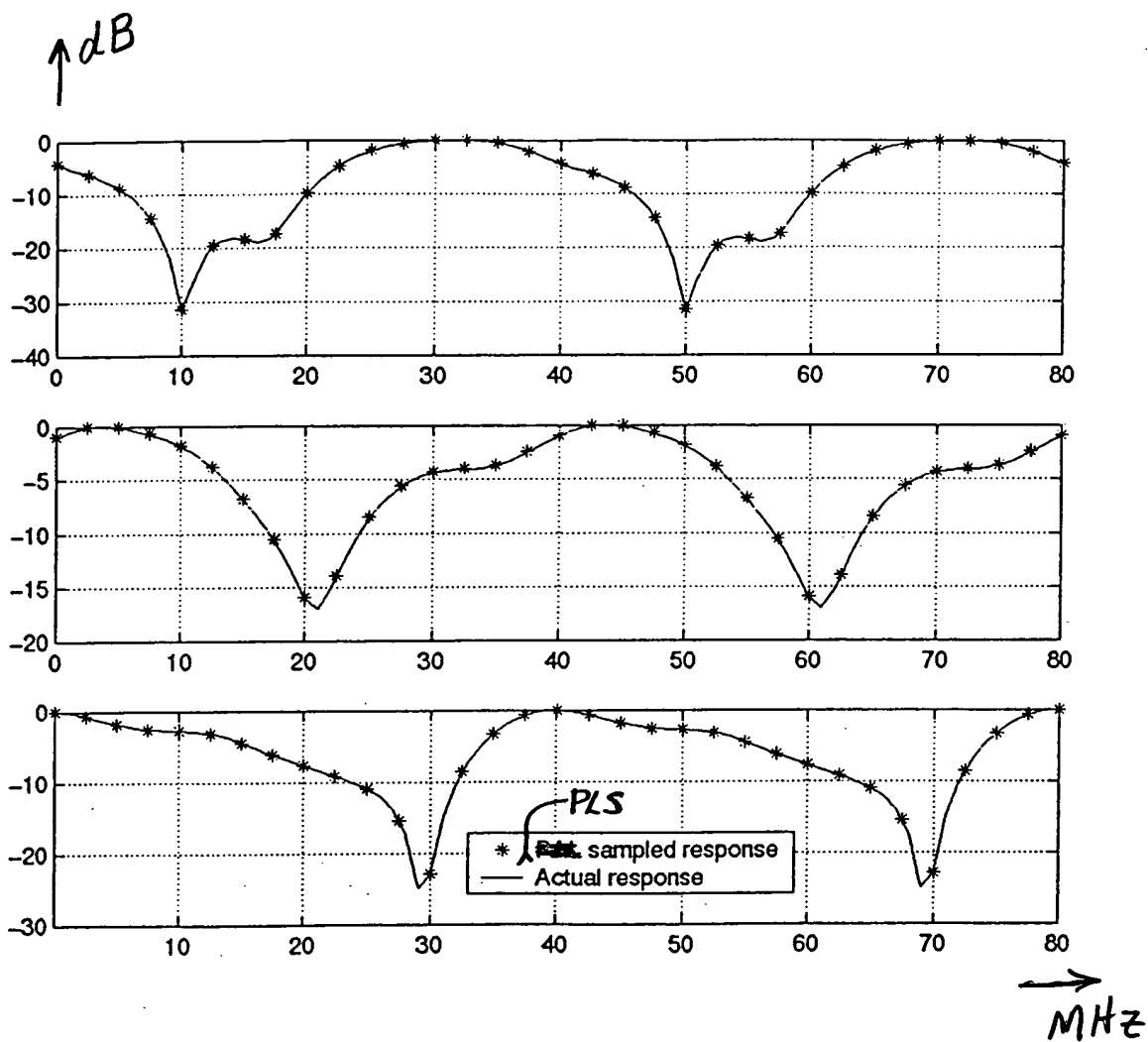


Figure 23

[illegible]

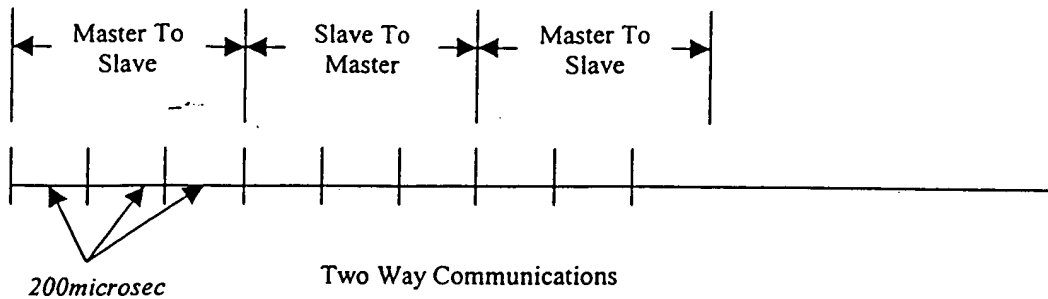


FIG. 24A

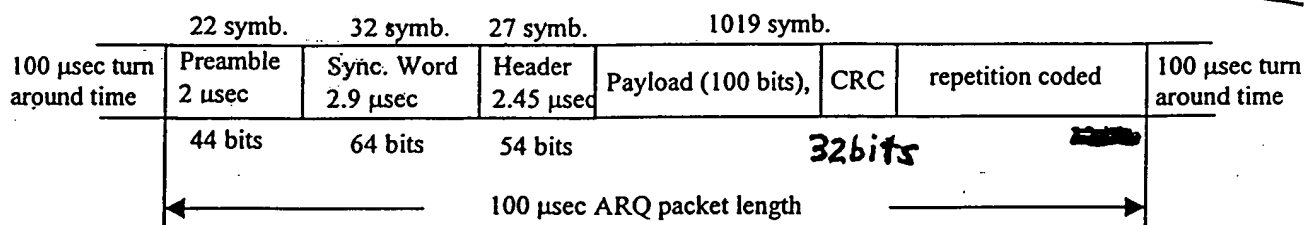
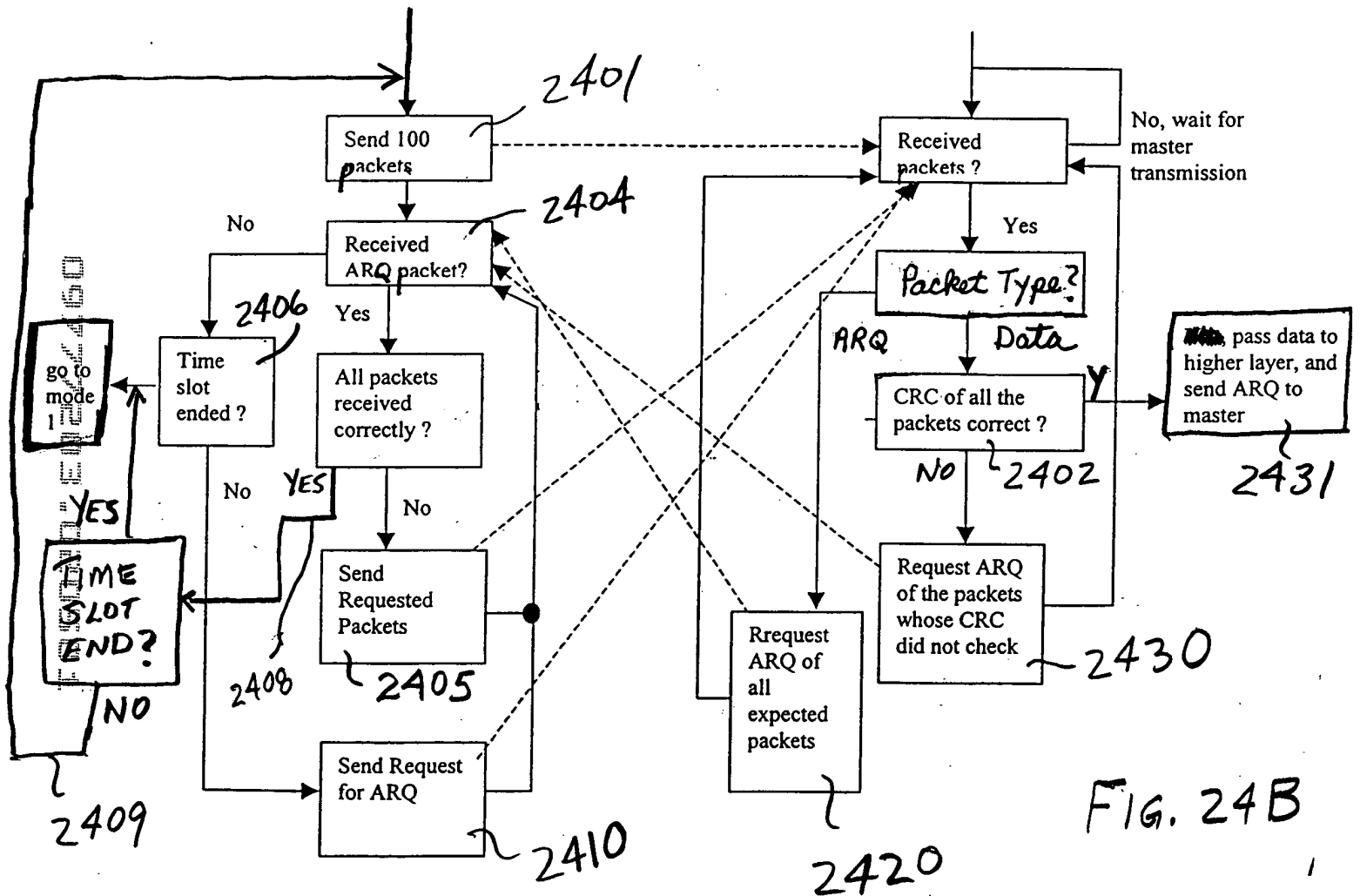


FIG. 25A

09777203-020501
TDS020-EO22260

Master

Slave



to higher layer

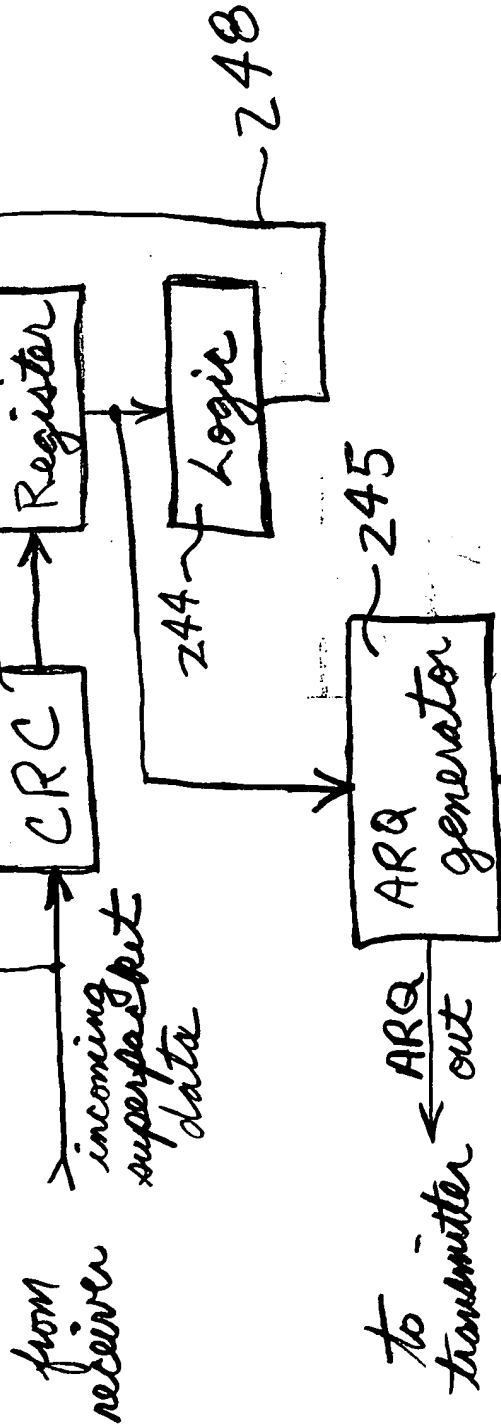
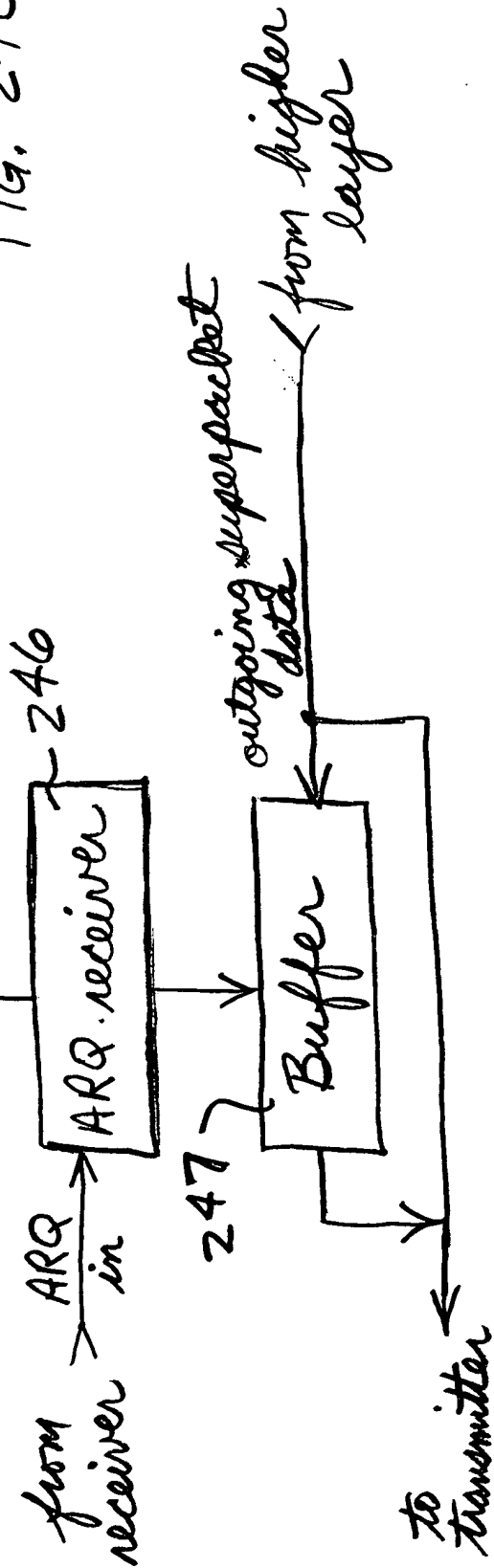


FIG. 24C



0977203-020504
T05020-022260

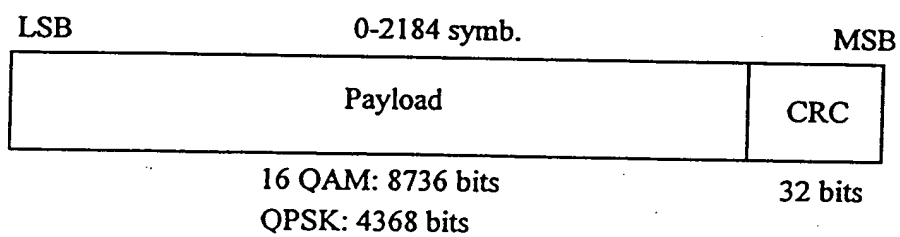


Figure 25

105020" E027760

22 symb.	32 symb.	27 symb.
Preamble 2 μ sec.	Sync. Word 2.9 μ sec.	Header 2.45 μ sec.
44 bits	64 bits	54 bits

Figure 26

FD-5020" E027260

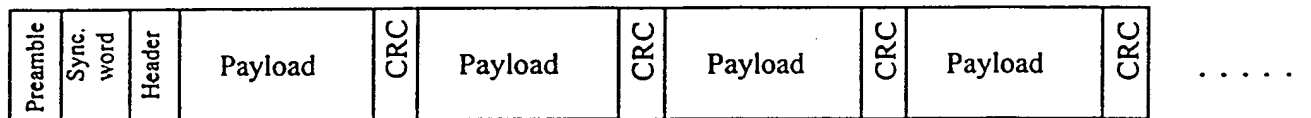


Figure 27

MPEG2 HDTV Video transmission using Mode 3	
Video data rate	18 Mbps
Video frames/sec	24
Video frames/Mode 3 slot	6
Mode 3 data rate	44 Mbps, 11 MSPS
Coding	Rate 1/2, Turbo
Modulation	16 QAM
Time in Bluetooth mode (T_1 msec.)	25 msec.
Time in Bluetooth mode for other devices	17.5 msec.
Time in Bluetooth mode for PAL	7.5 msec.
Slot time in Mode 3 (T_2 msec.)	225 msec.
Mode 3 packet size	4.4 Kbits
Data bits/packet	4368
CRC bits/packet	32
Mode 3 packet length	200 μ sec.
Number of packets/slot	1030
Length of training sequence	81 symbols, 7.36 μ sec.
Number of packets/training sequence	10
Number of packets/ARQ	100
Number of training sequences/packet	103
Time required to transmit video frames (no ARQ)	$204.5 + 1.5 + 0.76 = 206.76$ msec.
ARQ rate	9 %
Time required to transmit video frames with ARQ	225 msec.

Figure 28

FOUO-020200

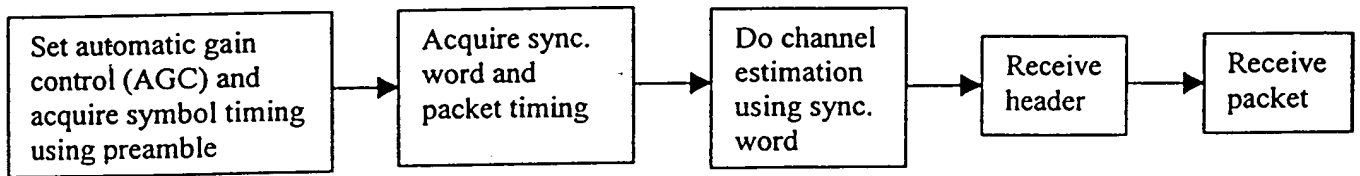


Figure 29

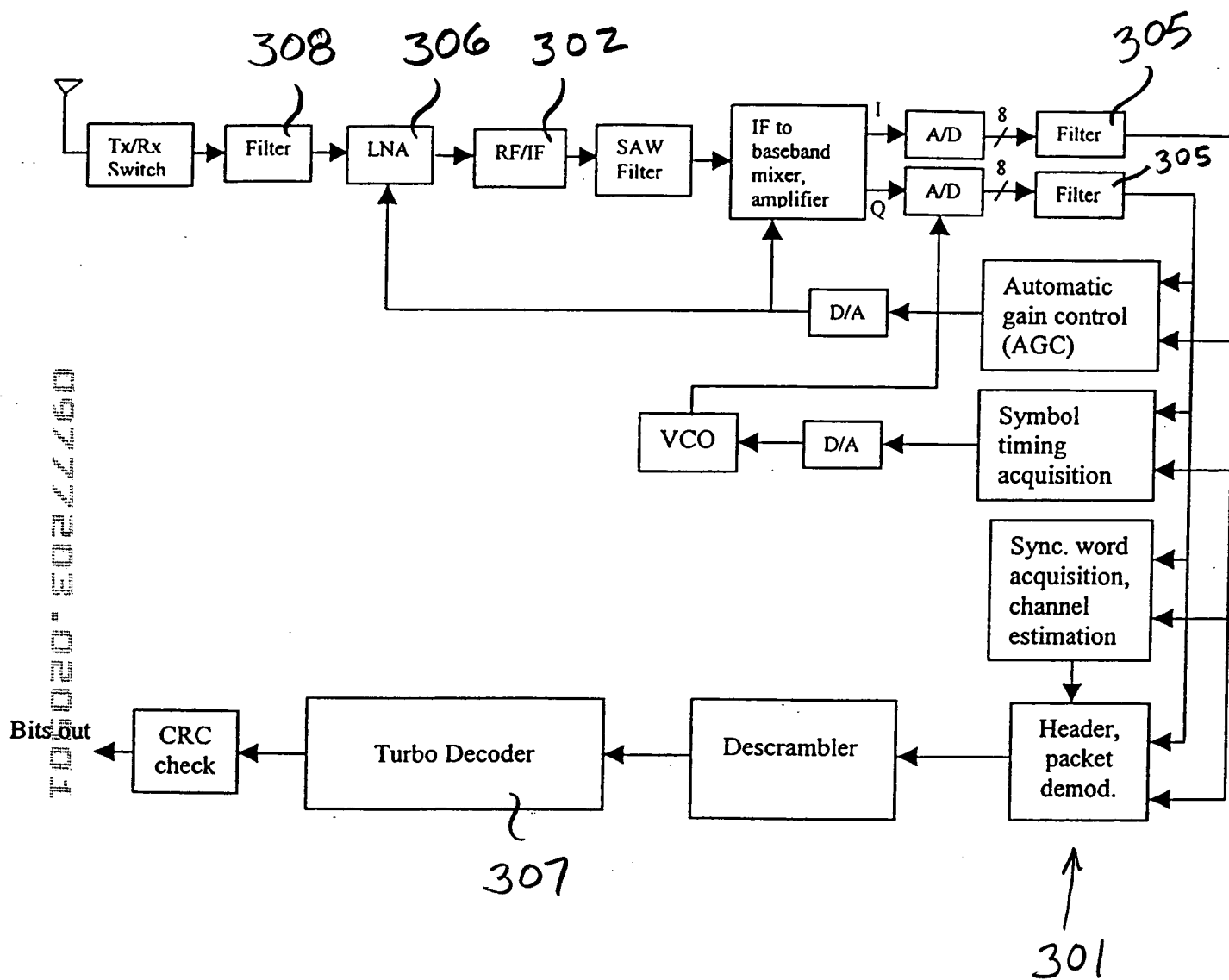


Figure 30

TOP SECRET E022260

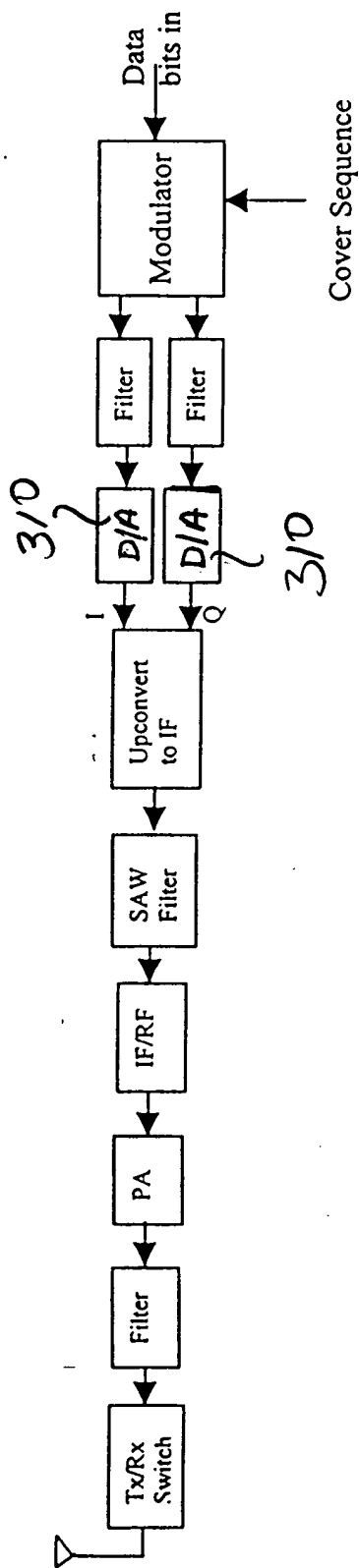


Figure 31

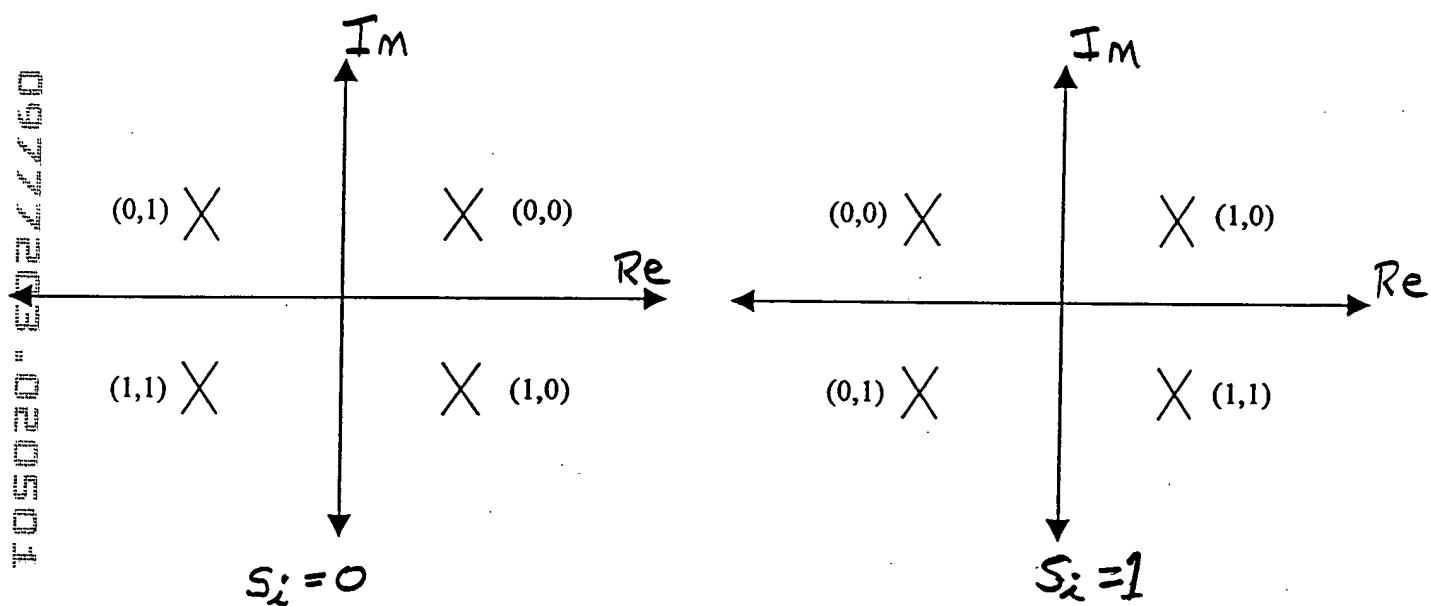


Figure 32

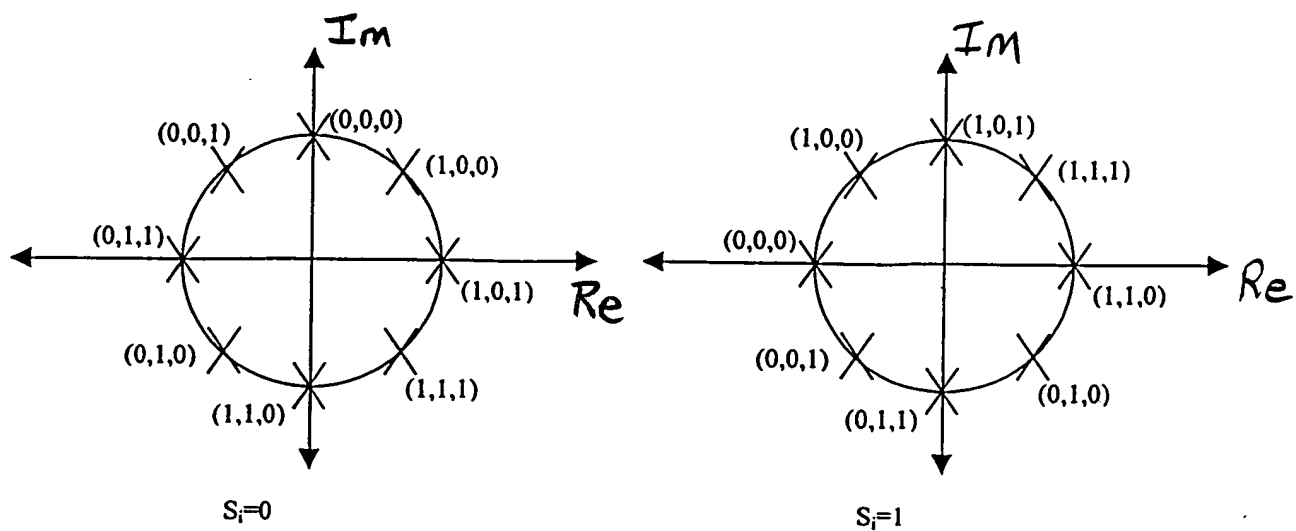


FIG. 32A

097000-0001

FO5020-ED4460

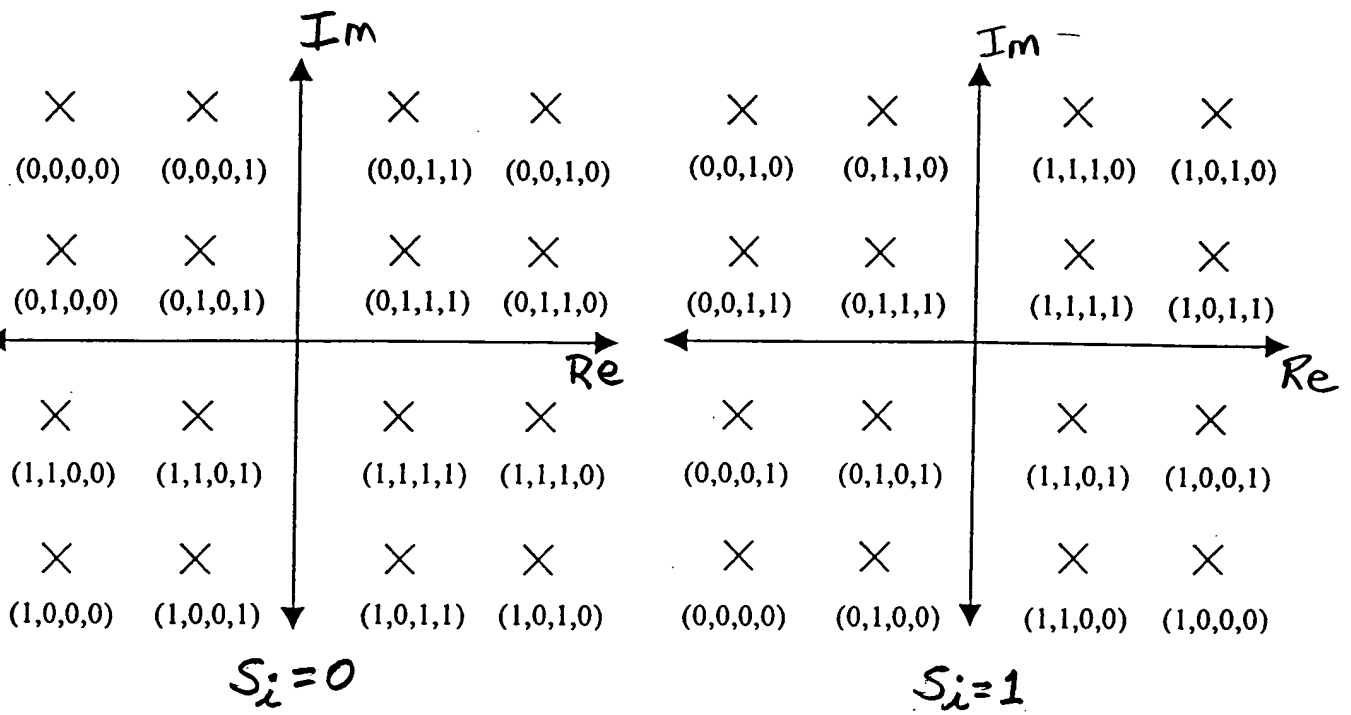


Figure 33

105020-602460

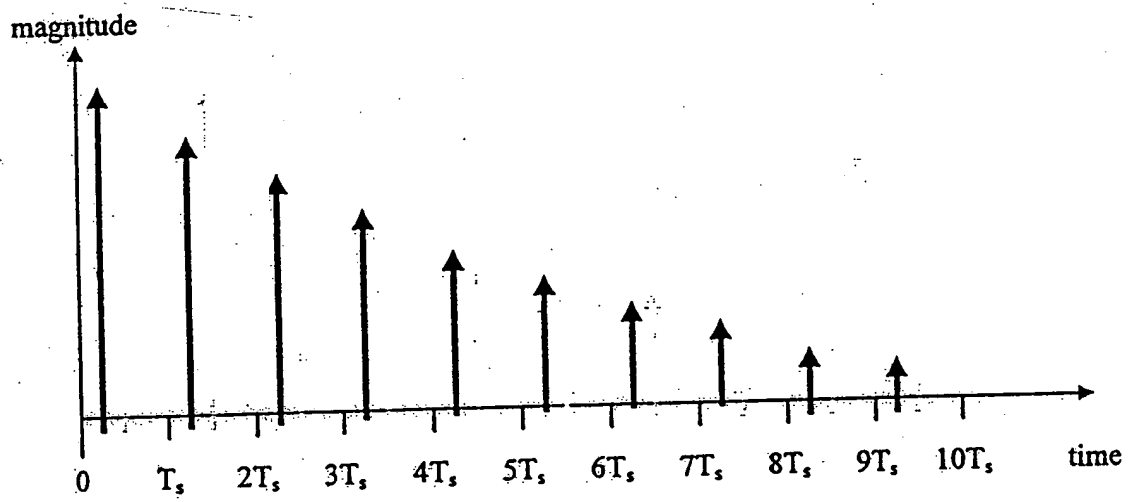


Figure 34

0977203.0202

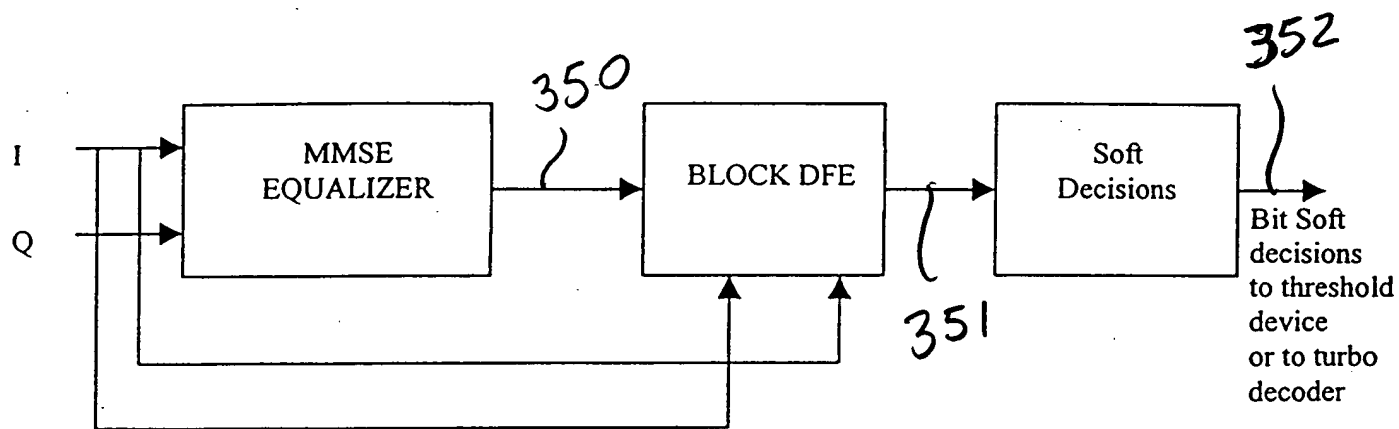


Figure 35

0977203.05001
F05020" E027760

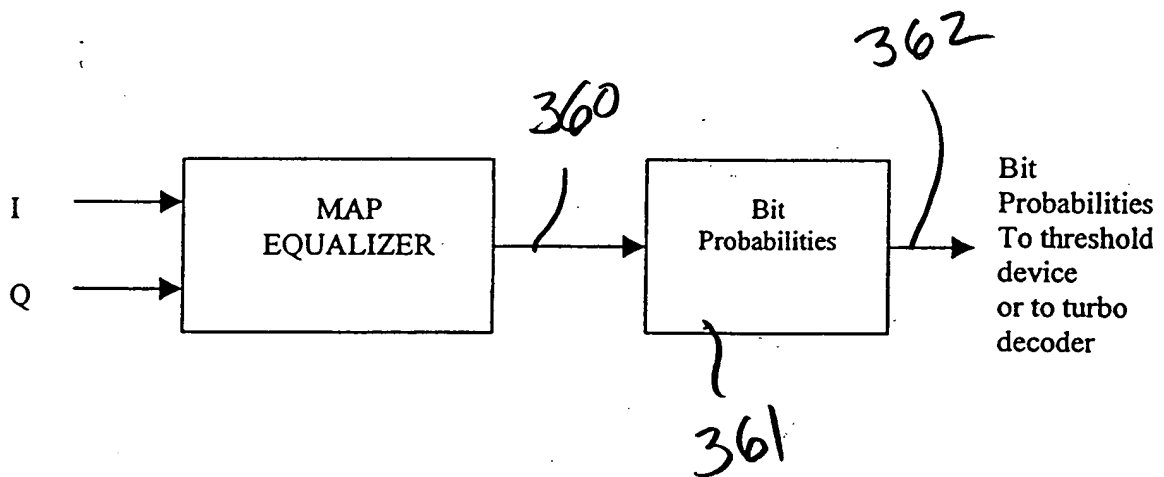


Figure 36

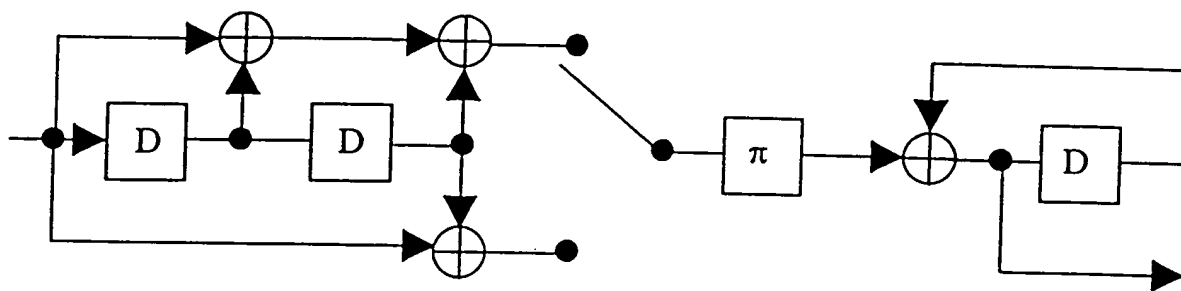


Figure 37

FO5020" E022260

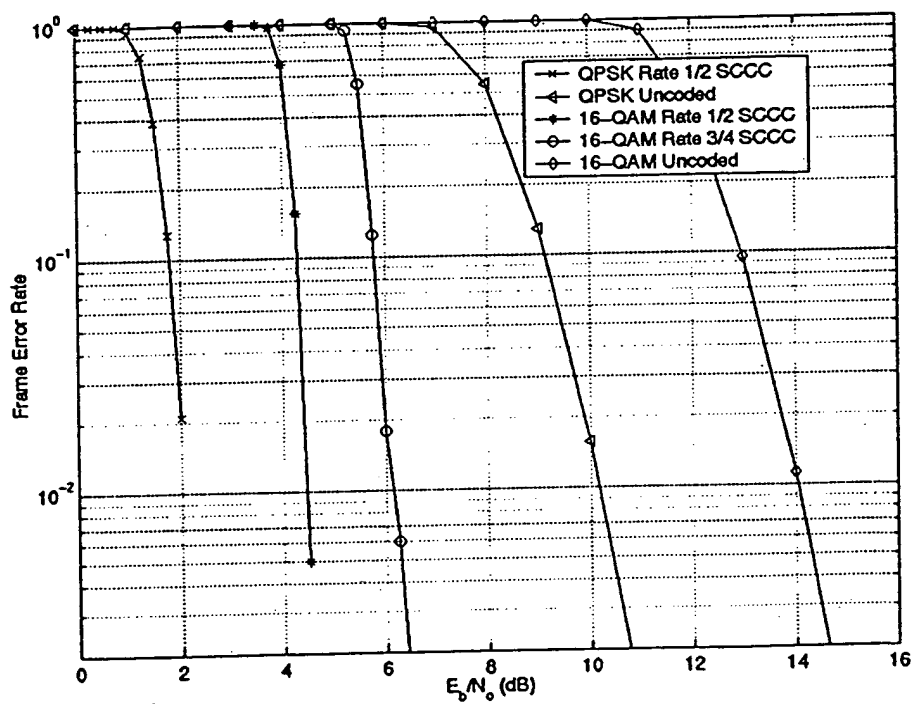


Figure 38

FO5020" E027760

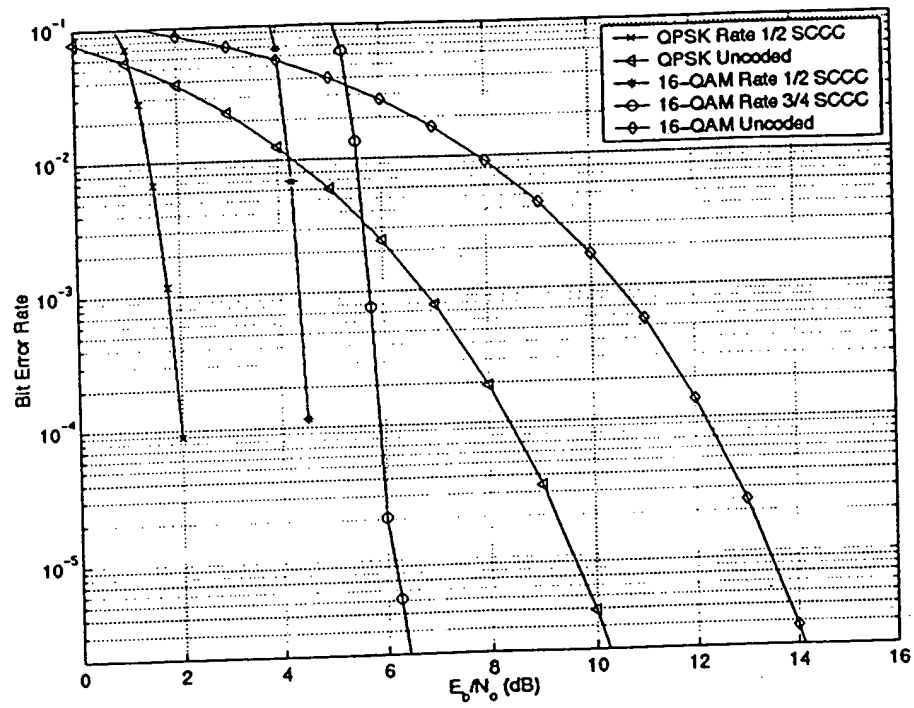


Figure 39

105020-EO27260

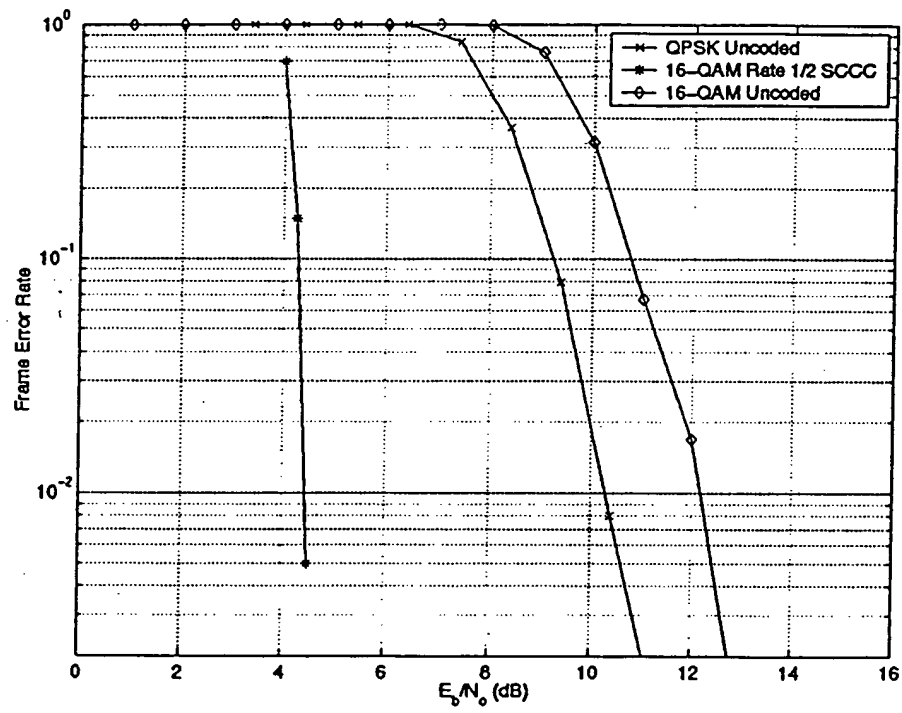


Figure 40

105020" E027260

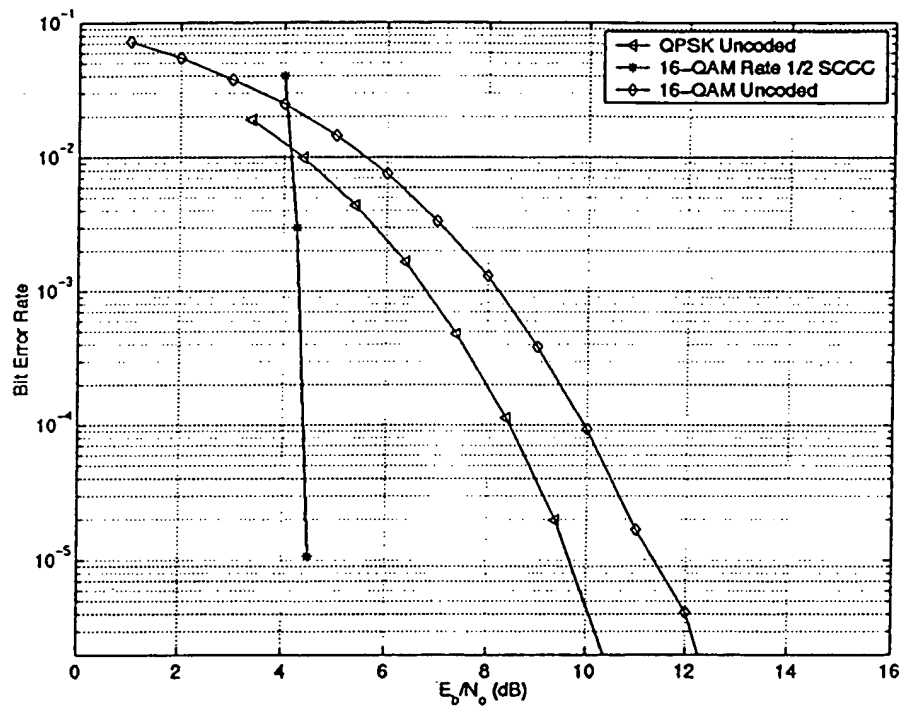


Figure 41

T.O.S.O.20* E.O.24260

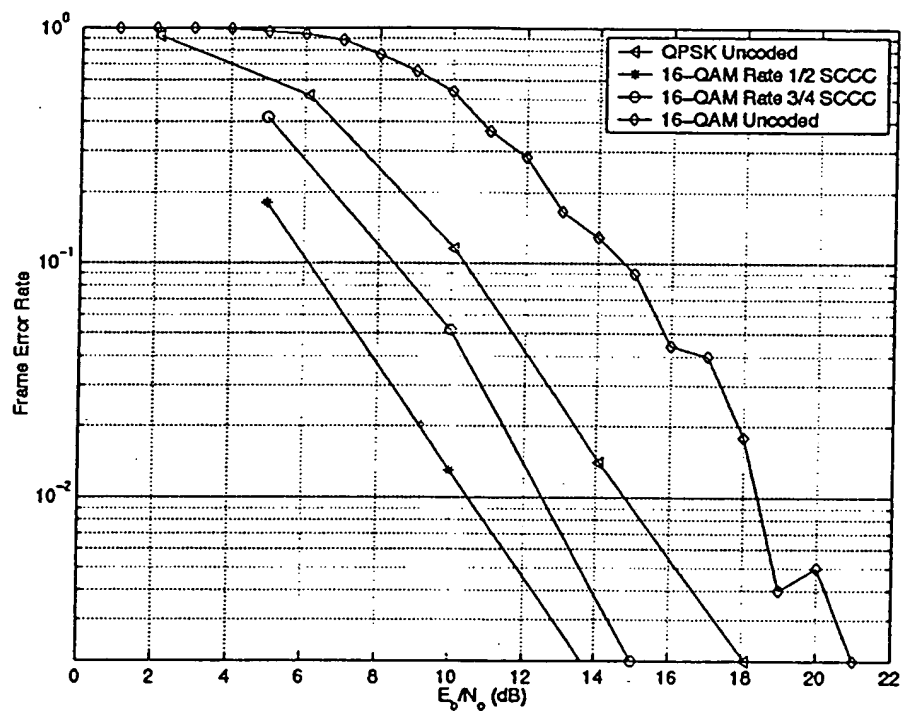


Figure 42

105020" E03/2/60

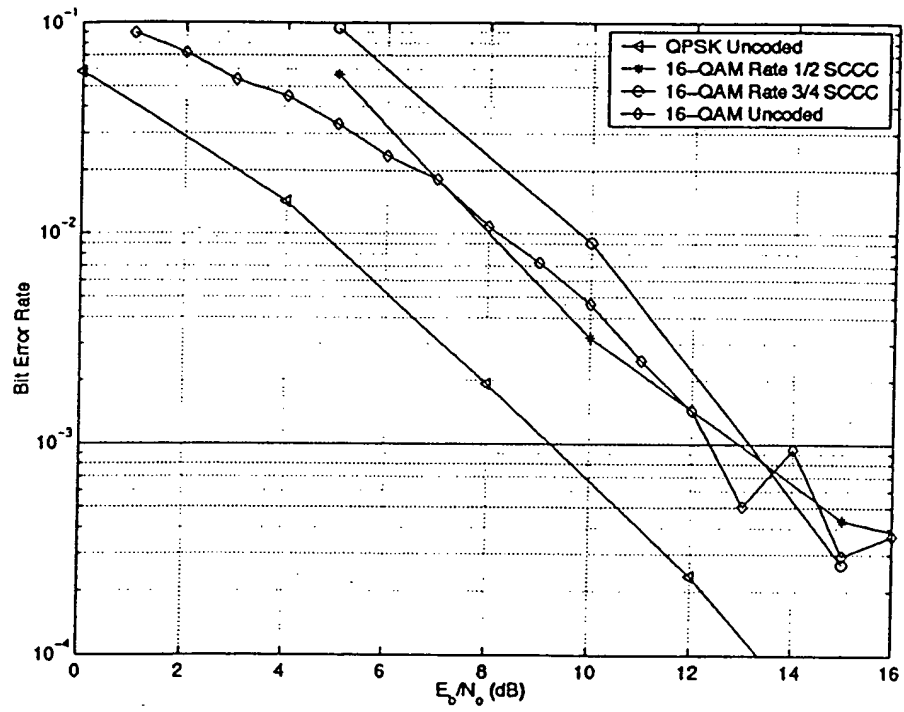


Figure 43

105020" 6022260

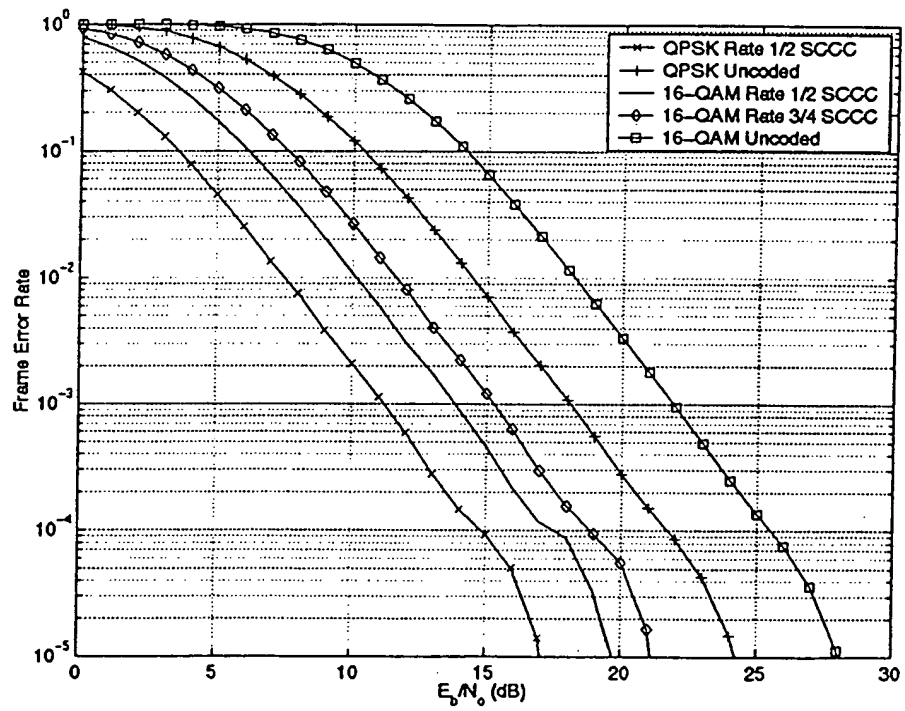


Figure 44